

DISCUSSION OF THE CLAIMS

Claims 1-5, 10-11 and 15-26 are pending in the present application. Claims 21-24 are new claims. Claim 1 is amended to recite a minimum diameter of 2.5 nm and to describe the interaction of energy transfer between the organic molecule and the other luminescent compound. Support for the amendment is found in the examples and on pages 32-33. Claims 6-9 and 12-14 are canceled claims. Support for new Claims 21-24 is found in the specification. Support for new Claim 21 is found in paragraph [0192] of the pre-grant publication, i.e., U.S. 2007/0202353. Support for new Claims 22-24 is found in the examples. Support for new Claims 25 and 26 is found in the paragraph bridging pages 32 and 33.

No new matter is added.

REMARKS

Applicants thank the Office for withdrawing the rejection of the claims as anticipated by one or both of the Shea references. Applicants further thank the Office for withdrawing the rejection of the claims under 35 U.S.C. § 112.

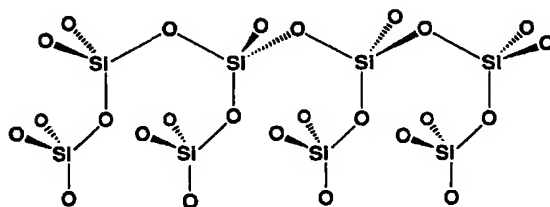
The Office rejects the claims for obviousness in view of Shea 1989 (Chemistry of Materials, 1989, 1, pp. 572-574) in view of Matthews (Chem. Mater., 1993, 5, pp. 1697-1700) or Bartl (Chem. Commun., 2002, pp. 2474-2475). The Office concedes that Shea 1989 does not describe a mesoporous luminescent material that includes a second luminescent compound. The Office asserts that those of skill in the art would be motivated to include a second luminescent material in the Shea 1989 composition based on the disclosure of the Bartl and/or Matthews publications.

With respect to Bartl the Office asserts that disclosure relating to the encapsulation of a rare earth material in a sol-gel derived composite would motivate those of skill in the art to include a second luminescent material in the Shea 1989 material (see paragraph no. 21 on page 7 of the March 2, 2011 Office Action). The Office argues a similar rationale for modifying Shea 1989 in view of Matthews. The Office asserts that Matthews' disclosure of a sol-gel material that contains a Eu complex would motivate those of skill in the art to include a second luminescent material in the Shea 1989 material (see paragraph no. 28 on page 9 of the March 2 Office Action).

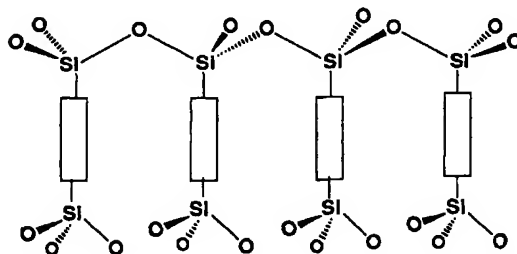
Applicants note that both the Bartl and Matthews compositions are based on an entirely different silicon-based material than that of the present claims. Both Bartl and Matthews describe a sol-gel derived from TEOS (i.e., tetraethylorthosilicate ($\text{SiOCH}_2\text{CH}_3$)₄). The evidence of record makes it clear that there are substantial differences between the properties and structures of a TEOS-derived sol-gel material and the mesoporous luminescent material of present Claim 1.

The claimed invention recites a material based on an organic silicon compound polymer of formula (1). The substantial differences in the structures of the Matthews and Bartl sol-gel materials in comparison to the mesoporous luminescent material of the present claims is readily evident in the Shea 1989 disclosure which compares the structural and electronic characteristics of the two different types of materials.

In the right-hand column on page 572 Shea describes the substantial difference in the chemical structures of TEOS-based sol-gels and the claimed mesoporous material. For convenience, the TEOS-based material structure is shown below in Figure 1 and that of a sol-gel that includes an organic spacer (which the Office alleges is similar to the material of the present claims) is shown in Figure 2, both reproduced from Shea 1989.



1



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The TEOS-based structure includes a silicon atom that is surrounded by four oxygen atoms. This contrasts with the structure of the aryl-bridged sol-gel materials described in Figure 2 of Shea 1989 where a silicon atom is bonded to only three oxygen atoms and bridged to a second silicon atom over an organic aryl group.

It is readily evident from even a cursory comparison of the structural characteristics of the Shea 1989 aryl-bridged materials and conventional TEOS-based sol-gels that there are substantial structural differences between the two types of compounds.

Shea 1989 further makes it clear that there are substantial differences in the electronic properties of the respective materials. Such differences are manifested in degrees of microporosity, hydrophilicity, and luminescent properties.

Moreover, the cited art does not provide any enabling disclosure by which those of skill in the art can introduce the phosphorescent material of Bartl and/or Matthews into pores of the Shea polymer. As conceded by the Office the Shea siloxane polymers have a mean pore diameter of 2 nm or smaller.

Applicants submit that the Office's basis for supporting the rejection is insufficient to set forth a *prima facie* case of obviousness. At best the Office demonstrated that it is conventional and/or obvious to include a second luminescent material such as a rare earth in a TEOS-based sol-gel. The Office has not shown, however, that one of ordinary skill in the art would expect that the inclusion of a second luminescent material in an aryl-bridged sol-gel would provide the same or similar performance of the TEOS-based sol-gel. The Office further failed to set forth any reason why one of skill in the art would disregard the substantial chemical and physical differences between TEOS-based sol-gels and the aryl-bridged sol-gels of Shea 1989.

Applicants respectfully request the withdrawal of the rejection on the basis that the Office fails to set forth a *prima facie* case of obviousness.

Applicants draw the Offices attention to new dependent Claims 21-24. New dependent Claim 21 describes a family of second luminescent materials. The art of record does not disclose or suggest a mesoporous luminescent material containing a second luminescent material selected from the group now recited in Claim 1. The cited art likewise

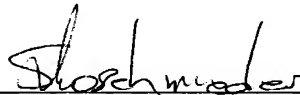
fails to disclose including such a second luminescent material in a sol-gel in the particular amount recited in Claim 22. Claims 23 and 24 are drawn to embodiments of the invention that require a particular second luminescent material.

New Claims 25 and 26 describe embodiments of the invention disclosed on pages 32 and 33 of the specification. Claim 25 recites functionality of the mesoporous luminescent material relating the capability of the organic molecule and the luminescent compound to interact and transfer absorbed energy. New Claim 26 further describes the properties of the mesoporous luminescent material in terms of its practical effect on luminance. The art of record fails to disclose or suggest the particular functionality described in new Claims 25 and 26.

For the reasons discussed above in detail, Applicants request withdrawal of the rejection and the allowance of all now-pending claims.

Respectfully submitted,

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